

# An overview of fish-based estuarine health indices for the Swan-Canning Riverpark

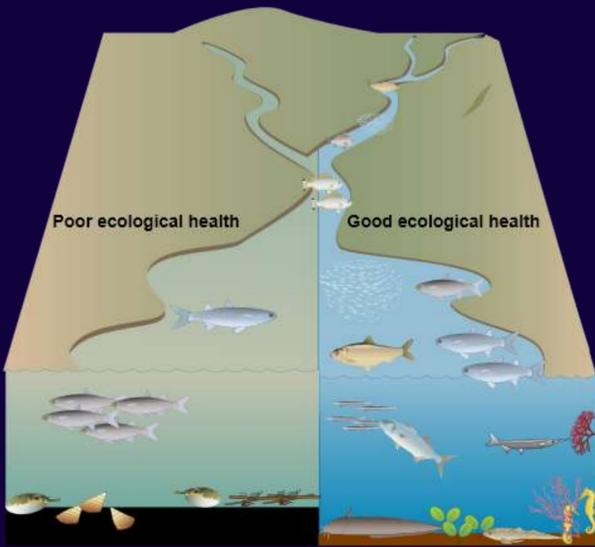
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## Background & Aims

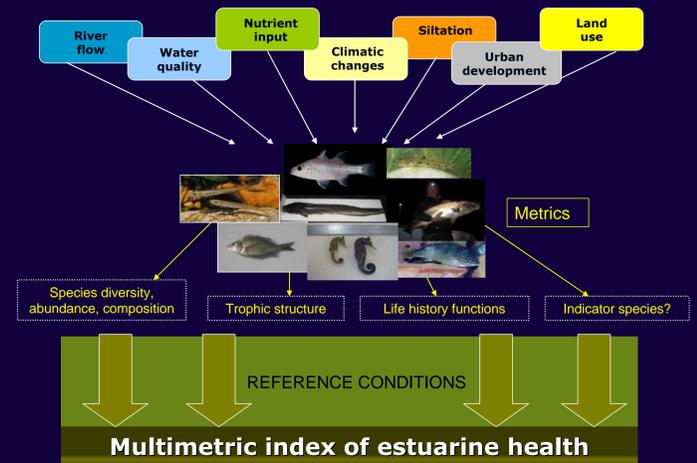
We aimed to develop and test an index for assessing the ecological health of the Swan-Canning Estuary, based on fish community characteristics.

A healthy estuary will have a diverse fish community with many specialist feeders and species which spawn in the estuary (see left).

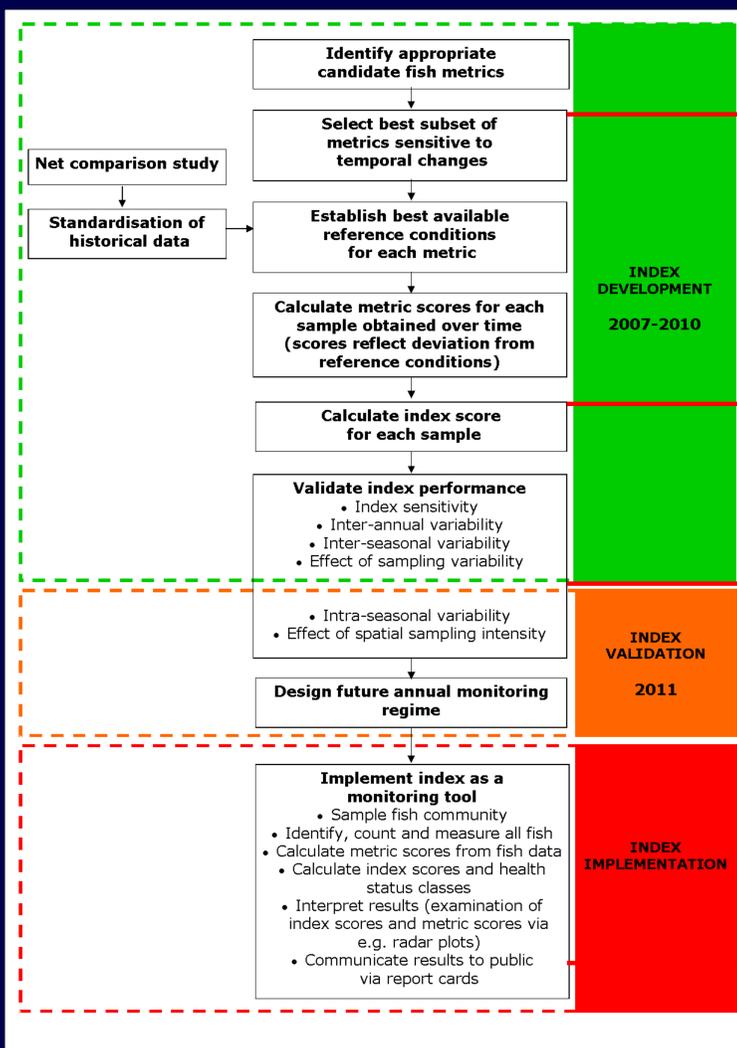
The indices we have developed combine information from a range of characteristics ('metrics') of the biological communities upon which they are based, to provide a rigorous, quantitative assessment of estuarine health (see right).



Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/)



## Methodology



Sensitive metrics selected for indices for shallow, nearshore and deeper, offshore waters.

Index scores (0-100) used to determine estuary health status

Extensive testing has shown indices are robust and reliable  
Indices respond sensitively to algal blooms

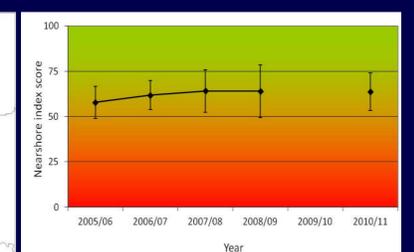
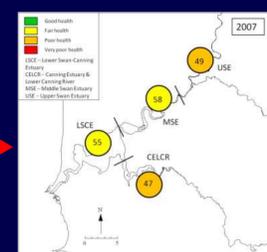
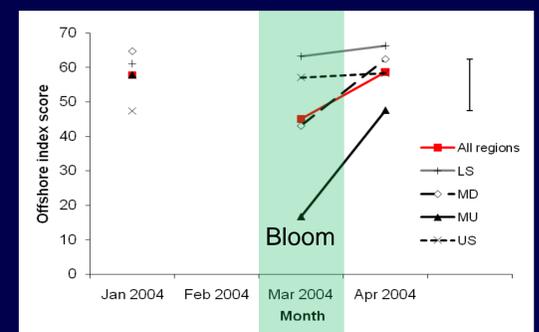
Indices can be used to assess, track and communicate the health of the Riverpark & its zones

(see accompanying talk)

## Results

| Metric                                       | Nearshore |       | Offshore |       |
|--|-----------|-------|----------|-------|
|  | Index     | Index | Index    | Index |
| Number of species                            | High      | High  | Low      | Low   |
| Dominance                                    | Low       | Low   | High     | High  |
| Shannon-Weiner diversity                     | High      | High  | Low      | Low   |
| Proportion of trophic specialists            | High      | High  | Low      | Low   |
| Number of trophic specialist species         | High      | High  | Low      | Low   |
| Number of trophic generalist species         | Low       | Low   | High     | High  |
| Proportion of detritivores                   | Low       | Low   | High     | High  |
| Feeding guild composition                    | High      | High  | Low      | Low   |
| Proportion of benthic-associated individuals | High      | High  | Low      | Low   |
| Number of benthic species                    | High      | High  | Low      | Low   |
| Proportion of estuarine spawning individuals | High      | High  | Low      | Low   |
| Number of estuarine spawning species         | High      | High  | Low      | Low   |
| Proportion of <i>Pseudogobius olorum</i>     | High      | High  | Low      | Low   |
| Total number of <i>Pseudogobius olorum</i>   | High      | High  | Low      | Low   |

Good Fair Poor Very poor  
 ≥ 75 ≥ 50 < 75 ≥ 25 < 50 < 25



## Science Outcomes

- We have developed the first fish-based indices for assessing the health of estuaries in Australia
- The indices are sensitive to environmental perturbations such as algal blooms
- They are robust and consistent, despite natural variability
- Index scores suggest that the deeper waters of the Upper Swan River zone are in relatively poorer health than the rest of the estuary
- Shallow, nearshore habitats provide crucial refuges for fish during algal bloom events

## Management Outcomes

- These indices reliably quantify, for the first time, the overall ecological health of the Swan-Canning Estuary, on a scale of 0-100
- Estuarine health can also be communicated qualitatively, as **Good, Fair, Poor, Very Poor**
- The indices can assess the health of individual management zones, and/or of the entire system
- Indices can be used to track and report changes in health over time and/or space
- A rigorous, cost-effective monitoring regime has been designed

### Acknowledgements:

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